Attorney Docket No.: 0553-0408

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)
Shinji MAEKAWA et al.	)
Serial No.: 10/827,457	)
Filed: April 19, 2004	)
For: Method For Forming Pattern And Drop Discharge Apparatus	)
Examiner: Marianne L. Padgett	)
Art Unit: 1715	)
Confirmation No.: 2984	)

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT K (AFTER FINAL)

In furtherance of Amendment J filed August 23, 2010, Applicants have the following response to the Final Rejection of June 23, 2009 and Advisory Action of September 2, 2010, a RCE being submitted herewith.

Please amend the above-identified application as follows:

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A pattern forming method comprising steps of:

forming a ~~liquid-repellent~~ thin film on a ~~an electrically insulating~~ surface~~, the liquid-repellent thin film being repellent to a liquid composition~~;

positioning the ~~electrically insulating~~ surface, a first nozzle and a second nozzle, the first and the second nozzles being integrated, so that the first nozzle and the second nozzle are in a region located above a selected portion of the ~~liquid-repellent~~ thin film;

irradiating the selected portion of the liquid-repellent thin film with a plasma of a gas originating from the first nozzle to selectively provide affinity for the liquid composition to the selected portion, after the step of positioning the integrated first nozzle and the integrated second nozzle; and

applying [[the]] a liquid composition to the selected portion by discharging a drop from the second nozzle by drop discharging method, after having irradiated the selected portion with the plasma,

forming a ~~wherein a predetermined~~ pattern ~~is formed~~ by repeating said steps of positioning, irradiating, and applying,

etching the thin film by plasma etching using gas sprayed by an array of nozzles, and using the pattern as mask;

wherein a quantity of gas sprayed varies according to the pattern.

2. (Currently Amended) A pattern forming method comprising steps of:

forming a thin film having affinity for a liquid composition on an electrically insulating surface;

positioning the electrically insulating surface, a first nozzle and a second nozzle, the first and the second nozzles being integrated, so that the first nozzle and the second nozzle are in a region located above a selected portion of the thin film;

selectively irradiating the selected portion of the thin film with a plasma of a gas originating from the first nozzle so as to etch an upper part of the thin film to modify a surface topography of the thin film in the selected portion by forming ~~to form~~ a groove or a hole in the selected portion or ~~to modify~~ by modifying a [[the]] surface roughness of the selected portion, after the step of positioning the integrated first nozzle and the integrated second nozzle;

forming a pattern by applying to the selected portion the liquid composition by discharging a drop from the second nozzle after having irradiated the selected portion with the plasma,

wherein a predetermined pattern is formed by repeating said steps of positioning, irradiating, and applying; and

wherein the modification of the surface topography of the thin film in the selected portion enhances retention of the liquid composition.

3. (Previously Presented) A pattern forming method according to claim 1, wherein the liquid composition comprises at least one selected from the group consisting of a conductive material, a resist material, a polymer material and a light emitting material.

4. (Previously Presented) A pattern forming method according to claim 1, wherein the liquid-repellent thin film is selected from the group consisting of a semiconductor film, a conductive film and a polymer film.

5. (Previously Presented) A pattern forming method according to claim 2, wherein the thin film having affinity for a liquid composition is selected from the group consisting of a silicon oxide film, silicon nitride film, a silicon oxynitride film and a metal oxide film.

6. (Previously Presented) A pattern forming method according to claim 1, wherein the irradiation with the plasma is performed at a pressure in a range of 1.3×10^1 to 1.31×10^5 Pa.

7-15. (Canceled)

16. (Previously Presented) A pattern forming method according to claim 2, wherein the liquid composition comprises at least one selected from the group consisting of a conductive material, a resist material, a polymer material and a light emitting material.

17. (Previously Presented) A pattern forming method according to claim 2, wherein the plasma irradiation is performed at a pressure in a range of 1.3×10^1 to 1.31×10^5 Pa.

18-22. (Canceled)

23. (Currently Amended) A pattern forming method comprising steps of:

positioning a surface, a first nozzle and a second nozzle, the first and the second nozzles being integrated, so that the first nozzle and the second nozzle are in a region located above a selected portion of the surface;

irradiating the selected portion of the surface with a plasma of a gas originating from the first nozzle to selectively provide affinity for a liquid composition having electrical conductivity, after the step of positioning the integrated first nozzle and the integrated second nozzle;

forming a conductive film by applying the liquid composition having electrical conductivity to the selected portion by discharging a drop from the second nozzle by drop discharging method, after having irradiated the selected portion with the plasma;

forming a mask pattern made of a resist composition over the selected portion; and

etching the conductive film selectively according to the mask pattern to form a conductive pattern by plasma etching,

wherein a quantity of gas sprayed by an array of nozzles for the plasma etching varies according to the mask pattern; and

wherein a predetermined wiring pattern is formed by repeating said steps of positioning, irradiating, applying, mask pattern forming, and etching.

24. (Previously presented) A pattern forming method according to claim 23, wherein the gas is selected from the group consisting of He, Ne, Ar, Kr, Xe, oxygen, nitrogen and a combination thereof.

25. (Currently Amended) A pattern forming method according to claim 23 wherein the mask pattern is formed by selectively applying the resist composition to the conductive pattern through a nozzle.

26. (Currently Amended) A pattern forming method comprising steps of:

positioning a surface, a first nozzle and a second nozzle, the first and the second nozzles being integrated, so that the first nozzle and the second nozzle are in a region located above a selected portion of the surface;

selectively irradiating the selected portion with a plasma of a gas originating from the first nozzle so as to etch an upper part of the thin film to modify a surface topography of the thin film in the selected portion by forming ~~to form~~ a groove in the selected portion or ~~to modify~~ by modifying a [[the]] surface roughness of the selected portion, after the step of positioning the integrated first nozzle and the integrated second nozzle;

forming a conductive film by applying a liquid composition comprising a conductive material to the selected portion by discharging a drop from the second nozzle by drop discharging method, after having irradiated the [[first]] selected portion with the plasma;

forming a mask pattern made of a resist composition over the selected portion after having performed the drop discharging method; and

etching the conductive film selectively according to the mask pattern to form a conductive pattern,

wherein a predetermined wiring pattern is formed by repeating said steps of positioning, irradiating, applying, mask pattern forming, and etching; and

wherein the modification of the surface topography of the thin film in the selected portion enhances retention of the liquid composition.

27. (Previously Presented) A pattern forming method according to claim 26 wherein the gas is selected from hydrogen, CF_4, NF_3, SF_6, oxygen and a combination thereof.

28. (Currently Amended) A pattern forming method according to claim 26 wherein the mask pattern is formed by selectively applying the resist composition to the conductive pattern through a nozzle.

29. (Previously Presented) A pattern forming method according to claim 1, wherein the application of the liquid composition is performed at a pressure in a range of 1.3×10^1 to 1.31×10^5 Pa.

30. (Previously Presented) A pattern forming method according to claim 2, wherein the application of the liquid composition is performed at a pressure in a range of 1.3×10^1 to 1.31×10^5 Pa.

31. (Previously Presented) A pattern forming method according to claim 23, wherein the etching is performed by locally discharging plasma from plural plasma discharge ports.

32. (Previously Presented) A pattern forming method according to claim 26, wherein the

etching is performed by locally discharging plasma from plural plasma discharge ports.

REMARKS

Entry of Amendment

As Applicants are filing a RCE herewith, this amendment should be entered and considered at this time.

Applicants will now address each of the rejections in the order in which they appear in the Final Rejection.

Claim Rejections – 35 USC §103

In the Final Rejection (and apparently maintained in the Advisory Action), the Examiner has the following rejections under 35 USC §103(a):

A. Claims 1-6, 16-17, and 29-30 are rejected as being unpatentable over Kiguchi et al. (U.S. 6,599,582) in view of Di Dio (U.S. 2004/0152329) and Speakman et al. (US 6,849,308), optionally further considering Lewis et al. (U.S. 5,272,979).

B. Claims 1, 3-4, 6 and 29 are rejected as being unpatentable over Kiguchi and Speakman, optionally further considering Lewis.

C. Claims 23-28 and 31-32 are rejected as being unpatentable over Kiguchi in view of Di Dio and Speakman), optionally considering Lewis, and further in view of Yamazaki et al. (U.S. 7,189,654).

These rejections are respectfully traversed.

Independent Claims 1 and 23

While Applicants traverse the rejection of these claims, in order to advance the prosecution of this application, Applicants are amending independent Claims 1 and 23. As amended, these claims correspond, for example, to Figs. 10(A) and 10(B) in the present application and are supported by, for example, paragraphs [0081] and [0082] in the publication of the present application (US

2005/0043186).

In contrast to amended Claims 1 and 23, the feature of etching a layer by plasma, where the gas of the plasma is sprayed by an array of nozzles in a manner such that the quantity of sprayed gas varies according to the pattern (see Fig. 10(B) and corresponding paragraph [0082] in the present application) is neither disclosed nor suggested by the cited references.

Therefore, independent Claims 1 and 23 are not disclosed or suggested by the cited references, and Claims 1, 23 and those claims dependent thereon are patentable over the cited references. Accordingly, it is respectfully requested that the rejection of these claims be withdrawn.

Independent Claims 2 and 26

While Applicants traverse the rejection of these claims, in order to advance the prosecution of this application, Applicants are amending independent Claims 2 and 26 to more specifically recite the features illustrated in Figs. 2(A) to 2(D) of the present application. Applicants note that the etching recited in Claims 2 and 26 results in topographical surface modification of a thin film and thereby an enhancement of liquid composition retention (either by forming a groove or by modifying its surface roughness), but NOT in the total etching of the thin film in its vertical direction. This feature is described, for example, in paragraph [0042] in the publication of the present application (US 2005/0043186).

In contrast, this feature is neither disclosed nor suggested by the cited references.

Therefore, independent Claims 2 and 26 are not disclosed or suggested by the cited references, and Claims 2, 26 and those claims dependent thereon are patentable over the cited references. Accordingly, it is respectfully requested that the rejection of these claims be withdrawn.

Double Patenting

Claims 23-28 and 31-32

The Examiner further rejects Claims 23-28 on the grounds of non statutory obviousness-type double patenting as being unpatentable over Claims 1-24 or Claims 1-16 of Yamazaki (U.S. 7,189,654) or Yamazaki (US 7,625,493) in view of Kiguchi further in view of Di Dio and Speakman, optionally considering Lewis et al. This rejection is also respectfully traversed.

As explained above, Applicants have amended Claims 23 and 26. These features are not recited in the claims in Yamzaki '654 or Yamazaki '493.

Therefore, it is respectfully submitted that there is no double patenting.

Claims 1-6, 16-17 and 23-30

Claims 1-6, 16-17 and 23-30 are rejected on the ground of non statutory obviousness-type double patenting as being unpatentable over Claims 1-16 of U.S. 7,625,493 in view of Kiguchi further in view of Di Dio, optionally considering Lewis et al.

As explained above, Applicants have amended Claims 1, 2, 23 and 26. These features are not recited in the claims in Yamazaki '493.

Therefore, it is respectfully submitted that there is no double patenting.

Accordingly, it is respectfully requested that the double patenting rejections be withdrawn.

Amendment To Claims

In addition to the above amendments, Applicants are slightly rewording passages of Claims 1, 2, 23, 25, 26 and 28 to correct informalities therein. No new matter is being added by these amendments. Accordingly, it is respectfully requested that the amendments be entered and allowed.

Conclusion

It is respectfully submitted that the present application is in a condition for allowance and should be allowed.

If any further fee should be due for this amendment and/or the RCE, please charge our deposit account 23-0920.

Favorable reconsideration is earnestly solicited.

Date: September 21, 2010

Respectfully submitted,

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